



SAFETY DATA SHEET (SDS): LIMESTONE ROCK-CRUDE OIL (SWEET) MIX (LRC)

SECTION I – IDENTIFICATION

PRODUCT IDENTIFIER	TRADE NAME	OTHER SYNONYMS
LRC	Limestone Rock- Crude Oil (Sweet) Mix (LRC)	None
RECOMMENDED USE AND RESTRICTION ON USE Used for construction purposes This product is not intended or designed for and should not be used as an abrasive blasting medium or for foundry applications.		
MANUFACTURER/SUPPLIER INFORMATION Martin Marietta Materials 2710 Wycliff Road Raleigh, North Carolina 27607 Phone: 919-781-4550 For additional health, safety or regulatory information and other emergency situations, call 919-781-4550		

SECTION II – HAZARD(S) IDENTIFICATION

<p>HAZARD CLASSIFICATION: Category 1A Carcinogen Category 1 Specific Target Organ Toxicity (STOT) following repeated exposures Category 1 Eye Damage Category 2 Skin Irritant Category 2 Germ Cell Mutagenicity Category 1 Aspiration Hazard</p> <p>SIGNAL WORD: DANGER</p> <p>HAZARD STATEMENTS: May cause cancer. Causes damage to respiratory system, kidneys, liver, central nervous system, hematopoietic (blood forming) system, lymphatic system (bone marrow) and immune system through prolonged or repeated exposure. Causes skin irritation and serious eye damage. Suspected of causing genetic defects May be fatal if swallowed and enters airways.</p> <p>PRECAUTIONARY STATEMENTS Do not handle until the safety information presented in this SDS has been read and understood. Do not breathe fume, vapors, sprays or mists. Do not eat, drink or smoke while manually handling this product. Wash skin thoroughly after manually handling. If swallowed: Immediately call a poison center or doctor and do not induce vomiting. If vomiting occurs, lean victim forward to reduce the risk of possible aspiration from the crude oil component. If on skin (or hair): Rinse skin after manually handling and wash contaminated clothing if there is potential for direct skin contact before reuse. If inhaled excessively: Remove person to fresh air and keep comfortable for breathing. If victim is not breathing, provide artificial respiration, or provide additional oxygen if trained to do so. Seek medical attention immediately. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do, and continue rinsing. If exposed, concerned, unwell or irritation of the eyes, skin, mouth or throat/nasal passage persists or develops: Get medical attention. Wear eye protection, protective clothing and respiratory protection following this SDS, NIOSH guidelines and other applicable regulations. Use protective gloves if manually handling the product. Avoid creating dust, sprays or mists when handling, using or storing. Use with adequate ventilation to keep exposure below recommended exposure limits. Dispose of product in accordance with local, regional, national or international regulations. Please refer to Section XI for details of specific health effects of the components.</p>	
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SECTION III – COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT(S) CHEMICAL NAME	CAS REGISTRY NO	% by weight (approx)
Crude Petroleum	8002-05-9 ⁽¹⁾	0-100
Sulfur Compounds	-	0-2
Saturates	-	80-90
Aromatics	-	8-15
Polars	-	1-5
Asphaltene Content	8052-42-4 ⁽²⁾	0-2
<i>May contain:</i> Benzene	71-43-2	0-0.1
Limestone	1317-65-3	0-100
Silicon Dioxide ⁽³⁾ , SiO ₂	7631-86-9	0-10
Aluminum Oxide, Al ₂ O ₃	1344-28-1	<1
Ferric Oxide, Fe ₂ O ₃	1309-37-1	<1
Magnesium Oxide, MgO	1309-48-4	0-8
Calcium Oxide, CaO	1305-78-8	0-43
Sodium Oxide, Na ₂ O	1313-59-3	<1
Potassium Oxide, K ₂ O	12136-45-7	<1
Calcium Carbonate, CaCO ₃	1317-65-3	40-100

(1) CAS No. for Petroleum Distillates (Naphtha)

(2) CAS No. for Asphalt

(3) The composition of SiO₂ may be up to 100% crystalline silica

SECTION IV – FIRST-AID MEASURES

INHALATION: If excessive inhalation occurs, remove to fresh air. Contact a physician if irritation persists or develops later. If victim is not breathing, provide artificial respiration, or provide additional oxygen if trained to do so. Seek medical attention immediately.

EYES: Immediately flush eye(s) with plenty of clean water for at least 15 minutes, while holding the eyelid(s) open. Occasionally lift the eyelid(s) to ensure thorough rinsing. Remove contact lenses, if present and easy to do, and continue rinsing. Beyond flushing. Contact a physician if irritation persists or develops later.

SKIN: Remove contaminated clothing. Rinse skin with soap and water after manually handling and wash contaminated clothing if there is potential for direct skin contact. Contact a physician if irritation persists or develops later. Thermal burns may require immediate medical attention, depending on severity and area burned.

INGESTION: Immediately call a poison center or doctor and do not induce vomiting. If vomiting occurs, lean victim forward to reduce the risk of possible aspiration from the crude oil component.

SIGNS AND SYMPTOMS OF EXPOSURE: There are generally no signs or symptoms of exposure to respirable crystalline silica. Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. The symptoms of acute silicosis which can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as 6 months, are the same as those associated with chronic silicosis; additionally, weight loss and fever may also occur. The symptoms of scleroderma, an autoimmune disease, include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

Direct eye contact with dust may cause irritation by mechanical abrasion or may cause mild to serious irritation including stinging, watering, redness, and swelling. Some components of the product are also known to cause corrosive effects to skin, eyes and mucous membranes. Skin contact may cause skin irritation including redness and a burning sensation may follow acute contact. Prolonged contact may cause dermatitis, folliculitis, or oil acne. The liquid component of the product may be absorbed through the skin in toxic amounts if large amounts of skin are exposed repeatedly. There have been rare occurrences of precancerous warts on the forearm, back of hands and scrotum from chronic prolonged contact with the crude oil component.

SECTION IV – FIRST-AID MEASURES, CONTD.

Ingestion may cause gastrointestinal disturbances including irritation, nausea, vomiting and diarrhea and ingestion of large amounts may cause gastrointestinal irritation and blockage. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur. The major threat of ingestion occurs from the aspiration (breathing) of drops of the liquid component of product into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure, and death. Inhalation of dust, fumes, vapors, sprays or mists may irritate nose, throat, mucous membranes and respiratory tract by mechanical abrasion or corrosive action. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate exposure limits. Repeated excessive exposure may cause pneumoconiosis, such as silicosis and other respiratory effects. Central nervous system effects caused by the crude oil component may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

SECTION V – FIRE-FIGHTING MEASURES**EXTINGUISHING AGENT**

Not flammable (not classified as flammable liquid based on GHS hazard classification); Class B fire extinguishing media such as CO₂ or foam is recommended for crude oil. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishing the fire, unless used under favorable conditions by experienced fire fighters.

UNUSUAL FIRE AND EXPLOSION HAZARD

The crude oil in this material may be ignited by heat, sparks, flames, or other sources of ignition. Vapors may travel considerable distance to a source of ignition where they can ignite, flashback, or explode. May create vapor/air explosion hazard indoors, in confined spaces or outdoors. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Contact with powerful oxidizing agents may cause fire and/or explosions (see Section X of this SDS). May readily ignite when mixed with naphtha and other volatile solvents. While individual components of limestone are known to react vigorously with water to produce heat, this is not expected from the LRC.

SPECIAL FIRE FIGHTING PROCEDURES

Fire-fighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

HAZARDOUS COMBUSTION PRODUCTS

Fires involving crude oil may produce irritating, corrosive and/or toxic gases. Combustion can yield carbon dioxide, carbon monoxide, possibly hydrogen sulfide, other organic compounds and sulfur oxides.

SECTION VI – ACCIDENTAL RELEASE MEASURES**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Persons involved in cleaning should first follow the precautions defined in Section VII of the SDS. Spilled product where fumes or vapors may be generated from the crude oil component may pose inhalation hazards. In circumstances of emergency response involving an inhalation hazard or potential inhalation hazard, personnel must wear positive self-contained breathing apparatus while engaged in the emergency response operations until it is determined through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees (29 CFR 1910.120(q)(3)(iv)). If the product has substantial amount of crude oil, then isolate and evacuate area after a spill. Shut off source if it is safe to do so. Eliminate all sources of ignition in the vicinity of the spill or released vapor. Contain liquid with vermiculite, sand or clay to prevent further contamination of soil, surface water or ground water. Place contaminated material in covered containers appropriate for disposal. Dispose of the product according to federal, state and local regulations. Follow prescribed procedures for reporting and responding to large spills. Advise the National Response Center if the substance has entered a waterway (1-800-424-8802).

Spilled materials, where dust can be generated, may overexpose cleanup personnel to respirable crystalline silica-containing dust and other components that may pose inhalation hazards. Do not dry sweep spilled material. Collect the material using a method that does not produce dust such as a High-Efficiency Particulate Air (HEPA) vacuum or thoroughly wetting down the dust before cleaning up. Place the dust in a covered container appropriate for disposal. Dispose of the dust according to federal, state and local regulations.

Wear appropriate personal protective equipment as specified in Section VIII including appropriate respirators during and following clean up of product to ensure worker exposures remain below occupational exposure limits (OELs - Refer to Section VIII).

SECTION VII – HANDLING AND STORAGE

This product is not intended or designed for and should not be used as an abrasive blasting medium or for foundry applications. Follow protective controls set forth in Section VIII of this SDS when handling this product. Dust containing respirable crystalline silica and other components that may be corrosive/irritant may be generated during processing, handling and storage. The crude oil component quickly evaporates and forms a vapor, which can catch fire and/or explode. Many sources can ignite the vapor, such as: pilot lights, welding equipment, and electrical equipment. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues.

Electrostatic charge may accumulate and create a hazardous condition. Review all operations that have the potential to generate an electric charge. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Use good housekeeping procedures to prevent the accumulation of dust in the workplace.

Do not breathe dust, vapors, fumes, mists or sprays. Avoid contact with skin and eyes. Do not store near food or beverages or smoking materials.

Do not stand on piles of materials; it may be unstable.

Use adequate ventilation and dust collection equipment and ensure that exposure to hazardous components are managed to below the appropriate OELs. If the component concentrations including dust levels are above the appropriate OELs, use respiratory protection during the establishment of engineering controls. Refer to Section VIII - Exposure Controls/Personal Protection for further information.

In accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21), state, and/or local right-to-know laws and regulations, familiarize your employees with this SDS and the information contained herein. Warn your employees, your customers and other third parties (in case of resale or distribution to others) of the potential health risks associated with the use of this product and train them in the appropriate use of personal protective equipment and engineering controls, which will reduce their risks of exposure.

See also ASTM International standard practice E 1132-06, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica."

For safe handling and use of this product for Hydraulic Fracturing, please see the OSHA/NIOSH Hazard Alert Worker Exposure to Silica during Hydraulic Fracturing DHHS (NIOSH) Publication No. 2012-166 (2012).

http://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.pdf

SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne OELs for Components of LRC:

COMPONENT(S) CHEMICAL NAME	MSHA/OSHA PEL	ACGIH TLV-TWA	NIOSH REL
Crude Petroleum ⁽¹⁾	2000 mg/m ³	-	350 mg/m ³ ; C 1800 mg/m ³
Sulfur Compounds	-	-	-
Saturates	-	-	-
Aromatics	-	-	-
Polars	-	-	-
Asphaltene Content	-	⁽²⁾ (I) 0.5 mg/m ³	-
Benzene	1 ppm; C 5 ppm	0.5 ppm; C 2.5 ppm	0.1 ppm; C 1 ppm
Limestone	(T) 15 mg/m ³ , (R) 5 mg/m ³	-	(T) 10 mg/m ³ , (R) 5 mg/m ³
Silicon Dioxide, SiO ₂	(R) 10 mg/m ³ / (% SiO ₂ +2) [§]	(R) 0.025 mg/m ³ #	(R) 0.05 mg/m ³ #
Aluminum Oxide, Al ₂ O ₃	(T) 15 mg/m ³ , (R) 5 mg/m ³	⁽⁵⁾ (R) 1 mg/m ³	-
Ferric Oxide, Fe ₂ O ₃	⁽⁴⁾ 10 mg/m ³	(R) 5 mg/m ³	⁽³⁾ 5 mg/m ³
Magnesium Oxide, MgO	⁽⁶⁾ 15 mg/m ³	(I) 10 mg/m ³	-
Calcium Oxide, CaO	5 mg/m ³	2 mg/m ³	2 mg/m ³
Sodium Oxide, Na ₂ O ⁽⁷⁾	2 mg/m ³	(C) 2 mg/m ³	(C) 2 mg/m ³
Potassium Oxide, K ₂ O	-	⁽⁸⁾ (C) 2 mg/m ³	⁽⁸⁾ (C) 2 mg/m ³
Calcium Carbonate, CaCO ₃	(T) 15 mg/m ³ , (R) 5 mg/m ³	-	(T) 10 mg/m ³ , (R) 5 mg/m ³

(1): Limits based on Petroleum Distillates (Naphtha)

(2): As Benzene-soluble Aerosol

§: Crystalline silica is normally measured as respirable dust. The OSHA/MSHA standard also presents a formula for calculation of the PEL based on total dust: 30 mg/m³ / (% SiO₂ +2). The OSHA/MSHA PEL listed is for dust containing crystalline silica (quartz) and is based on the silica content of the respirable dust sample. The OSHA/MSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz).

The ACGIH and NIOSH limits are for crystalline silica (quartz), independent of the dust concentration. The ACGIH TLV for crystalline silica as cristobalite is equal to the TLV for crystalline silica as quartz. In 2005, ACGIH withdrew the TLV for crystalline silica as tridymite. Refer to Section X for thermal stability information for crystalline silica (quartz).

(3): Limits based on Aluminum Metal and Insoluble Compounds.

(4): As Iron Oxide Fume.

(5): Dust and fume, as Iron

(6): As Magnesium Oxide Fume Total Particulate.

(7): Based on Sodium Hydroxide.

(8): Based on Potassium Hydroxide.

(R): Respirable Fraction.

(T): Total Dust.

(I): Inhalable Fraction.

(C): Ceiling Limit

Airborne OELs for Inert/Nuisance Dust:

Standard	Respirable Dust	Total Dust
MSHA/OSHA PEL (as Inert or Nuisance Dust)	5 mg/m ³	15 mg/m ³
ACGIH TLV (as Particles Not Otherwise Specified)	3 mg/m ³	*10 mg/m ³
NIOSH REL (Particulates Not Otherwise Regulated)	-	-

Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.

* The TLV provided is for inhalable particles not otherwise specified.

ENGINEERING CONTROLS

Ventilation: Use local exhaust, general ventilation or natural ventilation adequate to maintain exposures below appropriate exposure limits.

Other control measures: Airborne concentrations of volatile components and respirable dust and crystalline silica levels should be monitored regularly and levels in excess of appropriate exposure limits should be reduced by implementing feasible engineering controls, including (but not limited to) dust suppression (wetting), ventilation, process enclosure and enclosed employee work stations.

SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION, CONTD.**EYE/FACE PROTECTION**

Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively (visible) dusty conditions are present or are anticipated. If irritation persists, get medical attention immediately. There is potential for severe eye irritation if exposed to excessive concentrations of volatile components or dust for those using contact lenses.

SKIN PROTECTION

Supported polyvinyl chloride gloves should be worn to prevent skin contact. Protective clothing such as gloves, apron, boots, and facial protection should be worn when engineering controls or work practices are not adequate for prevention of skin contact.

RESPIRATORY PROTECTION

Respirator Recommendations:

Based on crystalline silica:

For respirable crystalline silica levels that exceed or are likely to exceed appropriate exposure limits, a NIOSH-approved particulate filter respirator must be worn. Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator repair and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-356-4674 or visit website: <http://www.cdc.gov/niosh/npg> (search for crystalline silica). See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

NIOSH recommendations for respiratory protection include:

Up to 0.5 mg/m³:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

Up to 1.25 mg/m³:

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate (100-series) filter.

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

Up to 2.5 mg/m³:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

Up to 25 mg/m³:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions (50 mg/m³ for crystalline silica-quartz): A self-contained breathing apparatus (SCBA) that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode or any supplied-air respirator that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape from unknown or IDLH conditions: An air-purifying, full-face piece respirator with a high-efficiency particulate (100-series) filter or any appropriate escape-type, self-contained breathing apparatus.

If the workplace airborne crystalline silica concentration is unknown for a given task, conduct air monitoring to determine the appropriate level of respiratory protection to be worn. Consult with a certified industrial hygienist, your insurance risk manager or the OSHA Consultative Services group for detailed information. Ensure appropriate respirators are worn, as needed, during and following the task, including clean up or whenever airborne dust is present, to ensure worker exposures remain below OELs.

Based on crude oil:

Where it has been determined that there is no hydrogen sulfide exposure hazard (exposure potential below H₂S permissible exposure limit) from the crude oil component, a NIOSH/MSHA-approved air purifying respirator with organic vapor cartridges or canisters may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed the volatile component limits for odor or irritation. Protection provided by air purifying respirators is limited.

Use a positive pressure, supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstances where an air-purifying respirator may not provide adequate protection.

SECTION VIII – EXPOSURE CONTROLS/PERSONAL PROTECTION, CONTD.

Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator repair and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-356-4674 or visit website: <http://www.cdc.gov/niosh/npg>. See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

Consult with a certified industrial hygienist, your insurance risk manager or the OSHA Consultative Services group for detailed information. Ensure appropriate respirators are worn, as needed, during and following the task, including clean up or whenever there is potential for exposure to volatile components of the product, to ensure worker exposures remain below OELs.

GENERAL HYGIENE CONSIDERATIONS

There are no known hazards associated with this material when used as recommended. Following the guidelines in this SDS are recognized as good industrial hygiene practices. Avoid breathing dust, fumes, sprays, vapors or mists. Avoid skin and eye contact. Wash dust-exposed skin with soap and water before eating, drinking, smoking and using toilet facilities. Wash work clothes after each use. Use care when laundering clothing to prevent formation of vapors which could ignite the washer or dryer.

SECTION IX— PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Mixture of angular gray particles ranging in size from powder to small stones with amber to green to black liquid	ODOR AND ODOR THRESHOLD Slight petroleum odor and not applicable
pH AND VISCOSITY Not available	MELTING POINT/FREEZING POINT -99 °F (Based on petroleum distillates)
BOILING POINT AND RANGE 379-1315° F (Based on crude oil)	FLASH POINT AND FLAMMABILITY 233 - 331° F and not flammable (Based on crude oil)
FLAMMABILITY/EXPLOSIVE LIMITS AND AUTOIGNITION TEMPERATURE Not available	EVAPORATION RATE AND DECOMPOSITION TEMPERATURE Not applicable
VAPOR PRESSURE AND VAPOR DENSITY IN AIR < 0.5 psi and 25.6 ° (API) (Based on crude oil)	SPECIFIC GRAVITY. 0.9 to 2.75 (Based on crude oil and limestone)
SOLUBILITY IN WATER Insoluble to slightly soluble	PARTITION COEFFICIENT: N-OCTANOL/WATER Log Kow: 2 to > 6 (Based on crude oil)

SECTION X – STABILITY AND REACTIVITY

STABILITY Stable	CONDITIONS TO AVOID Avoid high temperatures, open flames, sparks, welding, smoking and other sources of ignition. Contact with incompatible materials (see below).
THERMAL STABILITY If crystalline silica (quartz) is heated to more than 870°C (1598°F), it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470°C (2678°F), it can change to a form of crystalline silica known as cristobalite. See Hazardous Decomposition Products.	
INCOMPATIBILITY (Materials to avoid) Contact with powerful oxidizing agents such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride may cause fire and/or explosions. May readily ignite when mixed with naphtha and other volatile solvents. May react vigorously with acids, bases, halogens and metallic salts. Some components of limestone may react vigorously with water.	
HAZARDOUS DECOMPOSITION PRODUCTS Thermal decomposition of the material may release carbon monoxide, carbon dioxide, hydrogen sulfide, nitrogen dioxide, ozone and other organic and inorganic compounds into the atmosphere. The health effects of the decomposition products are discussed in Section XI. Silica dissolves in hydrofluoric acid producing a corrosive gas - silicon tetrafluoride.	
HAZARDOUS POLYMERIZATION Not known to polymerize	

SECTION XI – TOXICOLOGICAL INFORMATION

Health Effects: The information below represents an overview of health effects caused by overexposure to one or more components in LRC.

Primary routes(s) of exposure: ■ Inhalation ■ Skin ■ Ingestion

EYE CONTACT: Direct contact with dust may cause irritation by mechanical abrasion or corrosive action and contact with crude oil may cause mild to serious irritation including stinging, watering, redness, and swelling. Conjunctivitis may occur.

SKIN CONTACT: Direct contact may cause irritation by mechanical abrasion. Some components of material are also known to cause corrosive effects to skin and mucous membranes. Skin irritation may cause redness and a burning sensation may follow acute contact with crude oil. Prolonged contact with crude oil may cause dermatitis, folliculitis, or oil acne.

SKIN ABSORPTION: The liquid component may be absorbed through the skin in toxic amounts if large amounts of skin are exposed repeatedly. There have been rare occurrences of precancerous warts on the forearm, back of hands and scrotum from chronic prolonged contact.

INGESTION: Small amounts (a tablespoonful) of limestone swallowed during normal handling operations are not likely to cause injury. Ingestion of large amounts of product may cause gastrointestinal irritation and blockage. The major threat of ingestion of crude oil occurs from the aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure, and death. Ingestion may cause gastrointestinal disturbances including irritation, nausea, vomiting and diarrhea. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION: Inhalation of the dust, fumes, vapors, sprays or mists may cause respiratory and nasal irritation. Coughing, sneezing, chest pain, shortness of breath, inflammation of mucous membrane, and flu-like fever may occur following exposures in excess of appropriate dust exposure limits. Central nervous system effects of the crude oil component may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Inhaling respirable dust and/or crystalline silica may aggravate existing respiratory system disease(s) (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) and/or dysfunctions. Exposure to dust may aggravate existing skin and/or eye conditions. Smoking and obstructive/restrictive lung diseases may also exacerbate the effects of excessive exposure to this product. Inhaling vapors, fumes, mists or sprays of the crude oil component may aggravate existing skin disorders, respiratory conditions, liver or kidney dysfunction, male reproductive and peripheral nerve disorders.

This product is a mixture of components. The composition percentages are listed in Section II. Toxicological information is listed below:

Silicon Dioxide: It is comprised of amorphous and crystalline forms of silica. In some batches, crystalline silica may represent up to 100% of silicon dioxide.

Exposure route: Eyes, respiratory system.

Target organs: Eyes, skin, respiratory system.

ACGIH, MSHA, and OSHA have determined that adverse effects are not likely to occur in the workplace provided exposure levels do not exceed the appropriate exposure limits. Lower exposure limits may be appropriate for some individuals including persons with pre-existing medical conditions as described under medical conditions aggravated by exposure.

A. SILICOSIS

The major concern is silicosis (lung disease), caused by the inhalation and retention of respirable crystalline silica dust. Silicosis leads to conditions such as lung fibrosis and reduced pulmonary function. The form and severity in which silicosis manifests itself, depends in part on the type and extent of exposure to silica dusts: chronic, accelerated and acute forms are recognized. In later stages the critical condition may become disabling and potentially fatal. Restrictive and/or obstructive changes in lung function may occur due to exposure. A risk associated with silicosis is development of pulmonary tuberculosis (silico-tuberculosis). Respiratory insufficiencies due to massive fibrosis and reduced pulmonary function, possibly with accompanying heart failure, are other potential causes of death due to silicosis.

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.

Chronic or Ordinary Silicosis is the most common form of silicosis and can occur after many years of exposure to levels above the occupational exposure limits for airborne respirable crystalline silica dust. Not all individuals with silicosis will exhibit symptoms (signs) of the disease. Symptoms of silicosis may include (but are not limited to): Shortness of breath; difficulty breathing with or without exertion; coughing; diminished work capacity; diminished chest expansion; reduction of lung volume; heart enlargement and/or failure. It is further defined as either simple or complicated silicosis.

Simple Silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

Complicated Silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease (cor pulmonale) secondary to the lung disease.

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is a rapidly progressive, incurable lung disease and is typically fatal.

B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that there is "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the form of quartz or cristobalite", there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz dust" and that there is "*limited evidence* in experimental animals for the carcinogenicity of tridymite dust and cristobalite dust." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite dust is *carcinogenic to humans (Group 1)*." The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The monograph also stated that "Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C, "Silica Dust, Crystalline, in the Form of Quartz or Cristobalite" (2012).

NTP - In its Eleventh Annual Report on Carcinogens, concluded that respirable crystalline silica is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust.

OSHA - Crystalline silica is not on the OSHA carcinogen list.

CALIFORNIA PROPOSITION 65 - Crystalline silica in October 1996 was listed on the Safe Drinking Water and Toxic Enforcement ACT of 1986 as a chemical known to the state to cause cancer or reproductive toxicity.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information; the following are examples of recently published articles: (1) "Dose-Response Meta-Analysis of Silica and Lung Cancer", Cancer Causes Control, (20):925-33 (2009); (2) "Occupational Silica Exposure and Lung Cancer Risk: A Review of Epidemiological Studies 1996-2005", Ann Oncol, (17) 1039-50 (2006); (3) "Lung Cancer Among Industrial Sand Workers Exposed to Crystalline Silica", Am J Epidemiol, (153) 695-703 (2001); (4) "Crystalline Silica and The Risk of Lung Cancer in The Potteries", Occup Environ Med, (55) 779-785 (1998); (5) "Is Silicosis Required for Silica-Associated Lung Cancer?", American Journal of Industrial Medicine, (37) 252- 259 (2000); (6) " Silica, Silicosis, and Lung Cancer: A Risk Assessment", American Journal of Industrial Medicine, (38) 8-18 (2000); (7) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", Journal of Occupational and Environmental Medicine, (42) 704-720 (2000).

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.**C. AUTOIMMUNE DISEASES**

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted: (1) "Antinuclear Antibody and Rheumatoid Factor in Silica-Exposed Workers", *Arh Hig Rada Toksikol*, (60) 185-90 (2009); (2) "Occupational Exposure to Crystalline Silica and Autoimmune Disease", *Environmental Health Perspectives*, (107) Supplement 5, 793-802 (1999); (3) "Occupational Scleroderma", *Current Opinion in Rheumatology*, (11) 490-494 (1999); (4) "Connective Tissue Disease and Silicosis", *Am J Ind Med*, (35), 375-381 (1999).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: (1) "Tuberculosis and Silicosis: Epidemiology, Diagnosis and Chemoprophylaxis", *J Bras Pneumol*, (34) 959-66 (2008); (2) *Occupational Lung Disorders*, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); (3) "Risk of Pulmonary Tuberculosis Relative to Silicosis and Exposure to Silica Dust in South African Gold Miners," *Occup Environ Med*, (55) 496-502 (1998); (4) "Occupational Risk Factors for Developing Tuberculosis", *Am J Ind Med*, (30) 148-154 (1996).

E. KIDNEY DISEASE

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted: (1) "Mortality from Lung and Kidney Disease in a Cohort of North American Industrial Sand Workers: An Update", *Ann Occup Hyg*, (49) 367-73 (2005); (2) "Kidney Disease and Silicosis", *Nephron*, (85) 14-19 (2000); (3) "End Stage Renal Disease Among Ceramic Workers Exposed to Silica", *Occup Environ Med*, (56) 559-561 (1999); (4) "Kidney Disease and Arthritis in a Cohort Study of Workers Exposed to Silica", *Epidemiology*, (12) 405-412 (2001).

F. NON-MALIGNANT RESPIRATORY DISEASES

NIOSH has cited the results of studies that report an association between dusts found in various mining operations and non-malignant respiratory disease, particularly among smokers, including bronchitis, emphysema, and small airways disease. *NIOSH Hazard Review – Health Effects of Occupational Exposure to Respirable Crystalline Silica*, published in April 2002, available from NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226, or at <http://www.cdc.gov/niosh/02-129A.html>.

Respirable dust containing newly broken particles has been shown to be more hazardous to animals in laboratory tests than respirable dust containing older silica particles of similar size. Respirable silica particles which had aged for sixty days or more showed less lung injury in animals than equal exposures of respirable dust containing newly broken pieces of silica.

Aluminum Oxide:

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Inhalation or ingestion of high concentrations of this substance may cause gastrointestinal and/or upper respiratory tract irritation. Eye and skin irritant.

Chronic effect/carcinogenicity: Aluminum oxide is not classifiable as a human carcinogen. On occasion workers chronically exposed to aluminum-containing dusts or fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. Long-term exposure may have effects on the central nervous system.

Sodium Oxide:

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Corrosive – Sodium oxide reacts violently with water to form sodium hydroxide. Causes burns of skin, eyes, respiratory and gastrointestinal tracts, extremely destructive to mucous membranes.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.**Iron Oxide:** (Ferric Oxide)

Exposure route: Inhalation, ingestion, skin

Target organs: Respiratory system, skin, eyes, neurological system

Acute effect: Major findings: stupor, shock, acidosis, hematemesis, bloody diarrhea or coma. Minor findings: vomiting, diarrhea, mild lethargy. Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis. Experimental work in animals exposed by intratracheal injection or by inhalation to iron oxide mixed with less than 5% silica has shown no evidence of fibrosis produced in lung tissue.

Chronic effect/carcinogenicity: Irritability, nausea or vomiting, and normocytic anemia. When exposed to levels greater than 50 to 100 milligram per day, it can result in pathological deposition of iron in the body tissues causing fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis. Workers exposed to iron oxide fume and silica may develop a “mixed dust pneumoconiosis.” Not classifiable as human carcinogen.

Potassium Oxide:

Exposure route: Inhalation, ingestion, eye/skin contact.

Target organs: Respiratory system, gastrointestinal system, eyes, skin.

Acute effect: Corrosive – Potassium oxide reacts violently with water to produce potassium hydroxide. If inhaled, causes sore throat, cough, burning sensation and shortness of breath. Contact with skin produces pain and blisters. Severe deep burns, redness and pain occur with eye contact. Ingestion results in burning sensations, abdominal pain, shock or collapse.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Calcium Oxide:

Exposure route: Inhalation, ingestion, skin/eye contact.

Target organs: Eyes, skin, respiratory system.

Acute effect: Direct contact with tissues, can result in burns and severe irritation because of its high reactivity and alkalinity. Major complaints of workers exposed to lime consist of irritation of the skin and eyes, although inflammation of the respiratory passages, ulceration and perforation of the nasal septum, and even pneumonia has been attributed to inhalation of the dust.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Magnesium Oxide:

Exposure route: Inhalation, eye/skin contact.

Target organs: Eyes, respiratory system.

Acute effect: Magnesium oxide dust caused slight irritation of the eyes and nose, conjunctivitis, inflammation of the mucous membrane, and coughing up discolored sputum after industrial exposures amongst workers exposed to an unspecified concentration of MgO.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen.

Calcium Carbonate:

Exposure route: Inhalation, skin/eye contact.

Target organs: Eyes, skin, respiratory system.

Acute effect: Irritation of the eyes, skin and respiratory system and cough. It has been reported that there may be a silicosis risk when using impure limestone containing in excess of 3% quartz. However, it is claimed that pure calcium carbonate does not cause pneumoconiosis. Adverse health effects have generally not been reported in literature among workers using CaCO₃.

Chronic effect/carcinogenicity: Not classifiable as human carcinogen

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.**Crude Oil:**

Exposure Routes: Inhalation, ingestion, skin absorption, skin/eye contact

Target Organs: Eyes, skin, respiratory system, gastrointestinal system, central nervous system, liver kidney, hematopoietic (blood forming) system, lymphatic system (bone marrow), immune system and possibly reproductive system

Acute Effect: May cause eye, skin, respiratory and nasal irritation. Ingestion may cause vomiting, resulting in aspiration and chemical pneumonia. Central nervous system effects from inhalation may include headache, dizziness, rapid heart rate, tremors, confusion, anemia, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

Chronic Effect/Carcinogenicity: There have been rare occurrences of precancerous warts on the forearm, back of hands and scrotum from chronic prolonged skin contact. These warts were not necessarily on the exposed parts of the body. Crude Oil is not listed as a carcinogen by the NTP, IARC, or OSHA. However, repeated skin contact by laboratory mice produced skin tumors. The tumors reduced in occurrence when the animals' skin was washed between applications. Repeated exposure may affect the nervous system, liver, kidney, hematopoietic (blood forming) system, lymphatic system (bone marrow) and possibly the reproductive system.

Benzene: *This product may contain 0 – 0.1% benzene.*

Exposure Routes: Inhalation, skin absorption, ingestion, skin/eye contact

Target Organs: Hematopoietic (blood forming) system, lymphatic system, nervous system, reproductive system

Acute Effects: Inhalation (5-10 minutes) of very high levels of benzene (10,000-20,000 ppm) can result in death. Lower levels (700-3,000 ppm) can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Ingestion can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, coma, and death. Skin contact may cause redness and sores. Eye contact may cause irritation and cornea damage. Acute deaths from benzene exposure at high concentrations have been due to ventricular fibrillation caused by exertion and release of epinephrine.

Chronic Effects/Carcinogenicity: Benzene is on the NTP, OSHA and IARC carcinogen lists. The IARC and the EPA have determined that benzene is carcinogenic to humans (Group 1 Carcinogen). Chronic inhalation of certain levels of benzene causes disorders in the blood in humans, including leukemia (cancer of blood forming organs). Benzene specifically affects bone marrow (the tissues that produce blood cells). Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Several occupational studies suggest that benzene may impair fertility in women exposed to high levels. However, these studies are limited due to lack of exposure history, simultaneous exposure to other substances, and lack of follow-up.

Asphaltene Content (Based on Asphalt Bitumen):

Exposure route: Inhalation, ingestion, skin/eye contact.

Target organs: Eyes, skin and respiratory system

Acute effect: If product is heated or comes in contact with heated surfaces, exposure to asphalt fumes may increase. Asphalt fumes can cause ocular and respiratory irritation leading to coughing, shortness of breath, and headaches. Ingested asphalt has low toxicity however chewing of asphalt can cause gastric masses and stomach obstructions. Contact with hot asphalt can cause second and third degree burns.

Chronic effect/carcinogenicity: Not classifiable as a human carcinogen.

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.

In the event of significant heating, thermal decomposition or a fire, various gases may be released. The health effects of these products are described below:

Carbon Monoxide:

Exposure route: Inhalation.

Target organs: Respiratory system, cardiovascular system, blood, central nervous system.

Acute effect: Inhalation of carbon monoxide causes cell oxidation to be inhibited which results in a reduction of the oxygen carrying capacity to all organs of the body. Resulting acute effects may include confusion, dizziness, headache, nausea, unconsciousness and weakness. High level exposures can result in death.

Chronic effect/carcinogenicity: Prolonged exposure may have effects on the nervous system and the cardiovascular system. Suspected to cause reproductive effects such as neurological problems, low birth weight, increased still births and congenital heart problems.

Carbon Dioxide:

Exposure route: Inhalation.

Target organs: Respiratory system, cardiovascular system.

Acute effect: Inhalation of carbon dioxide may cause dizziness, headache, and elevated blood pressure. Inhalation of high concentrations of this gas may cause hyperventilation and unconsciousness.

Chronic effect/carcinogenicity: Information on chronic effect of prolonged exposure to this substance is not documented.

Hydrogen Sulfide:

Exposure route: Inhalation, skin/eye contact

Target organs: Eyes, respiratory system, central nervous system.

Acute effect: Inhalation, even at small levels can cause fatigue, headache, apnea, lung edema, coma, insomnia, irritability of the eyes and respiratory system, dizziness and central nervous system effects. In some cases respiratory paralysis leading to death can occur.

Chronic effect/carcinogenicity: Prolonged exposure to this material can cause toxicosis in people exposed to large concentrations. Not classifiable as a human carcinogen.

Under certain circumstances, Hydrogen sulfide, a highly flammable and toxic gas, may be released from molten asphalt. H₂S is a colorless gas with an odor similar to rotten eggs. Odor cannot be relied on as a means of detection because the olfactory nerves (sense of smell) rapidly become insensitive to it. In addition, the H₂S odor may be masked by the general odor of hot asphalt. Low concentrations (50 – 100 ppm) of H₂S can irritate the eyes and respiratory tract, and may cause nervousness, cough, nausea, and headache. Prolonged exposure to concentrations between 250 – 600 ppm, may cause pulmonary edema (fluid in the lungs) and bronchial pneumonia. Brief exposure to concentrations above 500 ppm can cause unconsciousness and may be fatal. The OSHA PEL is 20 ppm (ceiling). The ACGIH TLV is 10 ppm with a STEL of 15 ppm. H₂S may accumulate in an enclosed space. Persons should stand upwind and avoid breathing the gas when opening hatches and dome covers.

Nitrogen Dioxide:

Exposure route: Inhalation, ingestion, skin/eye contact

Target organs: Eyes, skin, cardiovascular system and respiratory system.

Acute effect: Inhalation can cause burning of the respiratory tract, sore throat, cough, lung edema, dizziness, headache, apnea, weakness and vomiting. Contact with the skin and/or eyes will cause redness, pain and possibly severe burns. Exposure to very high concentrations may lead to death.

Chronic effect/carcinogenicity: Not classifiable as a human carcinogen. Prolonged exposure to this material may cause increased susceptibility to respiratory infection may aggravate asthma and allergic disorders.

SECTION XI – TOXICOLOGICAL INFORMATION, CONTD.**Ozone:**

Exposure routes: Inhalation, skin/eye contact.

Target organs: Eyes, skin and respiratory system.

Acute effect: Inhalation may cause irritation of the respiratory tract, cough, headache, shortness of breath, asthmatic reactions and sore throat. Contact with the eyes will result in irritation, pain and redness and may result in loss of vision. It may cause effects on the central nervous system resulting in headache and impaired vigilance and performance.

Chronic effect/carcinogenicity: Not classifiable as a human carcinogen.

Sulfur Dioxide:

Exposure route: Inhalation, skin/eye contact.

Target organs: Eyes, skin and respiratory system.

Acute effect: Inhalation may cause irritation of the respiratory tract, asthma-like reactions, reflex spasm of the larynx, cough, shortness of breath, sore throat and lung edema. It is possible that respiratory arrest may occur which can lead to death. Contact with eyes can cause irritation, redness, pain and severe burns.

Chronic effect/carcinogenicity: Not classifiable as a human carcinogen. Repeated or prolonged exposure may aggravate asthma.

Acute Toxicity Estimates for LRC – Not Available

SECTION XII – ECOLOGICAL INFORMATION

Coating action of oil component of product may be toxic to aquatic organisms. Keep out of all bodies of water and sewage drainage systems. On release to the environment, the lighter components of crude oil may evaporate. The remaining portion may become dispersed in the water column or absorbed to soil or sediment. Crude oil is not readily biodegradable.

SECTION XIII – DISPOSAL CONSIDERATIONS**WASTE DISPOSAL METHOD**

Collect and reuse clean materials. Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations.

This material is not listed as a RCRA hazardous waste under Federal Regulations (40 CFR 261-271). This material may meet the criteria of an “ignitable” hazardous waste. This material could also become hazardous if mixed or contaminated with a listed hazardous waste.

SECTION XIV – TRANSPORT INFORMATION**DOT HAZARD CLASSIFICATION**

Flammable Liquid (Based on crude oil component)

PLACARD REQUIRED

Based on crude oil

**LABEL REQUIRED**

Label as required by the OSHA Hazard Communication standard {29 CFR 1910.1200(f)}, and applicable state and local regulations.

SECTION XV – REGULATORY INFORMATION

OSHA: Crystalline Silica is not listed as a carcinogen.

Carcinogen: Benzene, a possible component of this product, is on the NTP, OSHA and IARC carcinogen lists. The IARC and the EPA have determined that benzene is carcinogenic to humans (Group 1 Carcinogen). Benzene is number six on the CERCLA Priority List of Hazardous Substances. Benzene is classified as a substance known to the state of California to be a carcinogen and cause reproductive toxicity.

TSCA: Petroleum, asphalt, benzene, and limestone and its components appear on the EPA TSCA chemical substance inventory.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 40 CFR §302.4

EPCRA (Emergency Planning and Community Right to Know Act): Crystalline silica (quartz) is not an extremely hazardous substance under regulations of the Emergency Planning and Community Right to Know Act, 40 CFR Part 355, Appendices A and B and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by Martin Marietta Materials was not processed with or does not contain any Class I or Class II ozone depleting substances.

Clean Water Act (Oil Spills): Any spill or release of crude oil in this product to “navigable waters” or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV.D.3.b). Also contact appropriate state and local authorities.

Clean Water Act: Benzene has been designated as toxic pollutant pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations.

SARA 311 Categories: The Following EPA Hazard Categories apply to crude oil component of this product:

Immediate (Acute) Health Effects

Delayed (Chronic) Health Effects

Fire hazard

Federal Drinking Water Standards: Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: Benzene, MCL 0.005 mg/L.

State Drinking Water Standards (Benzene): (CA) CALIFORNIA 1 ug/L, (FL) FLORIDA 1 ug/L, (NJ) NEW JERSEY 1 ug/L, (AZ) ARIZONA 1.3 ug/L, (CT) CONNECTICUT 1 ug/L, (ME) MAINE 6 ug/L, (MN) MINNESOTA 3 ug/L

FDA Requirements: Benzene is an indirect food additive for use only as a component of adhesives. Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3). (The FDA standard primarily applies to products containing silica used in the coatings of food contact surfaces).

California Proposition 65: Respirable crystalline silica is classified as a substance known to the state of California to be a carcinogen.

Massachusetts Toxic Use Reduction Act: Respirable crystalline silica is considered toxic per the Massachusetts Toxic Use Reduction Act when used in abrasive blasting and molding.

Pennsylvania Worker and Community Right to Know Act: Quartz is considered hazardous for purposes of the Act, but it is not a special hazardous substance or an environmental hazardous substance.

SECTION XVI – OTHER INFORMATION**DEFINITIONS OF ACRONYMS/ABBREVIATIONS**

ACGIH: American Conference of Governmental Industrial Hygienists

ANSI: American National Standards Institute

APF: Assigned Protection Factor

California REL: California Inhalation Reference Exposure Limit

CAS: Chemical Abstracts Service

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act

CFR: US Code of Federal Regulations

DHHS: Department of Health and Human Services

EPA: Environmental Protection Agency

EPCRA: Emergency Planning and Community Right to Know Act

FDA: Food and Drug Administration

GHS: Globally Harmonized System

HEPA: High-Efficiency Particulate Air

IARC: International Agency for Research on Cancer

SECTION XVI – OTHER INFORMATION, CONTD.

DEFINITIONS OF ACRONYMS/ABBREVIATIONS, CONTD.

IDLH: Immediately Dangerous to Life and Health
MCL: Maximum Contaminant Levels MSHA: Mine Safety and Health Administration
NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services
NIOSH REL: NIOSH Recommended Exposure Limit
NRC: National Response Center
NTP: National Toxicology Program
OEL: Occupational Exposure Limit
OSHA: Occupational Safety and Health Administration, US Department of Labor
PEL: Permissible Exposure Limit
PMF: Progressive Massive Fibrosis
RCRA: Resource Conservation and Recovery Act
SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986
SDS: Safety Data Sheet
STOT: Specific Target Organ Toxicity
TLV: Threshold Limit Value
TSCA: Toxic Substance Control Act
TWA: Time-Weighted Average

User's Responsibility: The OSHA Hazard Communication Standard 29 CFR 1910.1200 requires that this SDS be made available to your employees who handle or may be exposed to this product. Educate and train your employees regarding applicable precautions. Instruct your employees to handle this product properly.

Disclaimer: The information contained in this document applies to this specific material as supplied and Martin Marietta Materials believes that the information contained in this SDS is accurate. The suggested precautions and recommendations are based on recognized good work practices and experience as of the date of publication. They are not necessarily all-inclusive or fully adequate in every circumstance as not all use circumstances can be anticipated. It may not be valid for this material if it is used in combination with other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for one's own particular use. Since the actual use of the product described herein is beyond our control, Martin Marietta Materials, assumes no liability arising out of the use of the product by others. Appropriate warnings and safe handling procedures should be provided to handlers and users. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulation, rules or insurance requirement. However, product must not be used in a manner which could result in harm.

An electronic version of this SDS is available at www.martinmarietta.com. More information on the effects of crystalline silica exposure may be obtained from OSHA (phone number: 1-800-321-OSHA; website: <http://www.osha.gov>) or from NIOSH (phone number: 1-800-35-NIOSH; website: <http://www.cdc.gov/niosh>).

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